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ABSTRACT

The Generic Skills studies were designed to provide training specifications that will enable graduates of trades training programs to compete for job placement in a range of occupations rather than in a single occupation. The studies identified a number of trade families, classified on the basis of skills used in work performance, and also identified the skill requirements for each of the trade families. Skills were identified through a questionnaire that measured the use of 588 trade tools, including portable hand tools power hand tools, test and diagnostic tools, shop machinery and equipment, wheeled vehicles, heavy mobile equipment, and associated safety processes. The questionnaire was administered to 1600 tradespersons, trades supervisors, technicians, technologists, and trades helpers, to determine which skills are used in work performance. A total of 131 occupations, mostly craft trades, were involved in the survey. The data were tabulated by occupation and by skill to determine which skills belonged to which occupations and which skills were required in all or most of the occupations. Commonality factors were determined for each pair of occupations identified and were used to formulate trade families. Lists of skills common to trade families were made up for mechanics, machinists, metal workers, woodworkers, and construction workers. In addition, a list of core skills common to all occupations was generated. (KC)

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GENERIC SKILLS

Trade Families

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Based on data on the use of 588 tool skills from 1600 workers and supervisors in 131 occupations

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Employment and Immigration Canada
Emploi et Immigration Canada

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Disponible en français sous le titre: Habiletés génériques: Familles d'emplois

THE QUESTION OF "IF"

If workers in different occupations use many of the same technical skills, then separate occupational training or development programs and unique occupational credentials are inefficient and wasteful, both for national employment policies and for the workers concerned.

If out-of-work people cannot get jobs which they have the skills to perform because they have the wrong credentials, then the system is harmful to the individuals.

If the Canada Employment and Immigration Commission has many out-of-work clients who cannot be placed because of credential rather than skill deficiencies, then the system is harmful to the nation as well as to the individual.

If employers cannot maximize the resources of their employees because of artificial credential restraints, then the system is harmful to productivity.

If guilds, unions and occupational associations tend to stress the uniqueness of separate occupations and to deny entry for reasons other than skill deficiencies, then the system is not working in the interests of national human resource development.

If workers are denied experience in allied occupations for artificial reasons, then the system is working against career growth of the individual.

If training institutions provide pre-employment training for a number of occupations having common occupational skill requirements, such as the care and use of hand tools, then provision of separate workshops, instructors and instructional resources must be inefficient.

If students in skill training programs develop the attitude that they are only qualified for entry into a single occupation, they will be ill-prepared for technological change and fluctuating labour markets.

Trade Families

The purpose of this pamphlet is to provide training specifications which will enable graduates of trades training programs to compete for job placement in a range of occupations rather than for a single occupation.

This pamphlet identifies a number of trade families, classified on the basis of communality of skills used in work performance, and also identifies the skill requirements for each of the identified trade families.

Which trades do not belong?
(or will the real mechanics please stand up?)

COMMUNALITY MATRIX

Figures shown in this matrix are the percentages of communality of skills between trades. The Boilerhouse Repairer shares 83% skills with the Aircraft Mechanic and 49% with the Office Machine Repairer.

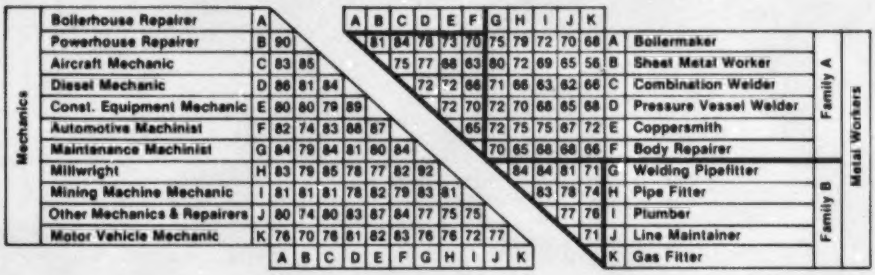
	Aircraft Mechanic	Boilerhouse Repairer	Const. Equipment Mechanic	Diesel Mechanic	Automotive Machinist	Maintenance Machinist	Millwright	Mining Machinery Mechanic	Motor Vehicle Mechanic	Powerhouse Repairer	Body Repairer	Instrument Repairer	Office Machine Repairer
Aircraft Mechanic		83	79	84	83	84	85	81	76	85	68	57	52
Boilerhouse Repairer	83		80	86	82	84	83	81	76	90	67	56	49
Const. Equipment Mechanic	79	80		89	87	80	77	82	82	80	77	57	55
Diesel Mechanic	84	86	89		88	81	78	78	81	81	71	60	56
Automotive Machinist	83	82	87	88		84	82	79	83	74	74	55	64
Maintenance Machinist	84	84	80	81	84		92	83	76	79	68	52	50
Millwright	85	83	77	78	82	92		81	76	79	67	50	49
Mining Machinery Mechanic	81	81	82	78	79	83	81		72	81	72	53	47
Motor Vehicle Mechanic	76	76	82	81	83	76	76	72		70	73	55	58
Powerhouse Repairer	85	90	80	81	74	79	79	81	70		64	54	46
Body Repairer	68	67	77	71	74	66	67	72	73	64		50	53
Instrument Repairer	57	56	57	60	55	52	50	53	55	54	50		63
Office Machine Repairer	52	49	55	56	54	50	49	47	58	46	53	63	

Data from the Generic Skills studies show that the Automotive Machinist and the Maintenance Machinist have high percentages of skills in common with the mechanics trades. However, these two trades are usually classified with the machinists trades. A Maintenance Machinist and a Millwright have 92% of tool skills in common — a Maintenance Machinist and a General Machinist have only 78% of tool skills in common.

Conversely the Body Repairer, Instrument Repairer and Office Machine Repairer, who are usually classified with the mechanics, actually share more skills in common with other trade families. The Instrument Repairer, for instance, has communalities of 72% with the Major Appliance Repairer and 71% with the Electrical Instrument Repairer.

In this pamphlet, occupations have been grouped in trade families only on the basis of the communality of tool skills used in work performance. The goal is two-fold:

- to achieve economies in training; and
- to improve the versatility and placement prospects of graduates.


Mechanics
Boilerhouse Repairer A
Powerhouse Repairer B 90
Aircraft Mechanic C 83 85
Diesel Mechanic D 86 81 84
Const. Equipment Mechanic E 80 80 79 89
Automotive Machinist F 82 74 83 88 87
Maintenance Machinist G 84 79 84 81 80 84
Millwright H 83 79 85 78 77 82 92
Mining Machine Mechanic I 81 81 81 78 82 79 83 81
Other Mechanics & Repairers J 80 74 80 83 87 84 77 75 75
Motor Vehicle Mechanic K 76 70 78 81 82 83 76 76 72 77
A B C D E F G H I J K
A B C D E F G H I J K
81 84 78 73 70 75 79 72 70 68 A Boilermaker
75 77 68 63 60 72 69 65 56 B Sheet Metal Worker
72 72 66 71 66 63 62 66 C Combination Welder
72 70 72 70 68 65 68 D Pressure Vessel Welder
65 72 75 75 67 72 E Coppersmith
70 65 68 68 66 F Body Repairer
84 84 81 71 G Welding Pipefitter
83 78 74 H Pipe Fitter
77 76 I Plumber
71 J Line Maintainer
K Gas Fitter
Family A
Family B
Metal Workers

Shown above are three of the trade families which have been identified on the basis of high degrees of communalities in skill usage. The trades in the mechanics family have an average skill communality of 80.9%; those in family A of the metal workers have an average communality of 72.4%; and those in family B have 77.9%.

The trades in family B of the metal workers are normally classified with the construction trades. However, they have poor communality with trades such as Paperhanger, Plasterer and Bricklayer and have much more in common with the metal working trades.

Data source

A questionnaire which measured the use of 588 trade tools, including portable hand tools, powered hand tools, test and diagnostic tools, shop machinery and equipment, wheeled vehicles, heavy mobile equipment, and associated safety processes, was administered to 1600 tradesmen/women, trades supervisors, technicians, technologists and trades helpers, to determine which skills are used in work performance. A total of 131 occupations, mostly craft trades, were involved in this survey.

Data reliability

16 of these occupations were surveyed twice. In the main survey, job holders identified the skills which they used in work performance. An independent survey of 16 of the 131 occupations, in which trades supervisors provided the data on skills used in these occupations, was carried out to determine the reliability of these data. The independent survey (N equalled 160) and the sub-sample of the main survey (N equalled 159) were compared with a resulting correlation (Pearsons' r) of 0.97.

Data analyses

The data were tabulated by occupation and by skill to determine which skills "belonged" to which occupations and which skills were required in all or most of the occupations. As in previous generic skills studies, a cut-off of 30% was used as the criterion (if 30% or more of the job holders responded to a particular skill, it was recorded as an occupational requirement).

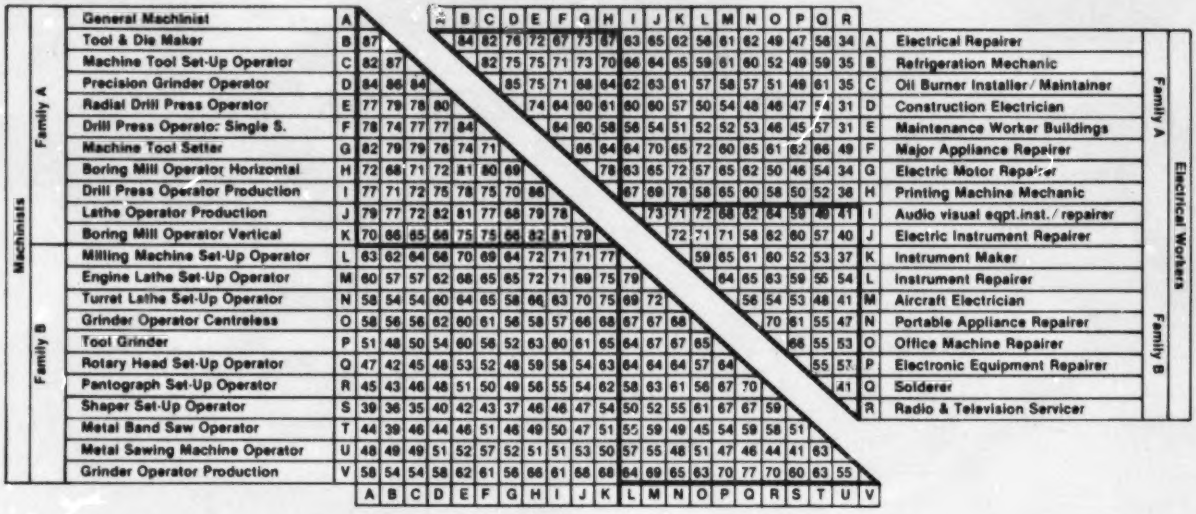
To make the data more amenable to analyses, the 588 skills were arranged in 137 skill classes (e.g. 22 types of pliers were generalized to 6 classes of pliers).

Each pair of occupations was compared to determine the percentages of skills held in common (COMMUNALITY FACTOR) and the percentage of skills which each occupation used of the total skills held by the other occupation (TRANSFERABILITY FACTOR). As an example, Aircraft Mechanics use 93% of the skills of a Body Repairer and Body Repairers use 72% of the skills of an Aircraft Mechanic. These two percentages are called Transferability Factors. The Communality Factor between these two occupations is, however, only 68%.

After the Communality Factors had been established for each pair of occupations, the factors were used to determine which occupations 'belonged together' based on a high communality of skills. In the mechanics family, for instance, The Boilerhouse Repairer and Powerhouse Repairer, with a communality of 90%, were first selected. Through trial and error other occupations were compared to these two until it was found that the Aircraft Mechanic had the highest relationship with these two occupations. This process was continued until the homogeneity (average communality) rapidly declined, thus indicating that an occupational family had been completed. The same process was carried out to establish the remaining trade families.

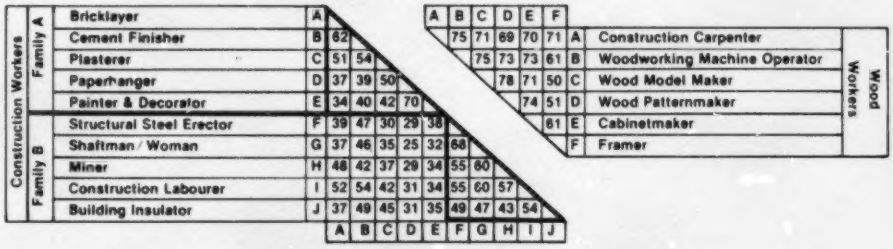
In some cases, such as the metal workers shown above, it was found that improved homogeneity could be established by dividing the group into two families. The metal workers have an average communality of 71.6% but the division into two families improved the average communalities to 72.4% and 77.9%. Although this improved average communality is not in itself markedly significant, the division into two sub-families had a marked effect in the later process of identifying the family skills.

Additional Trade Families



Shown above are the machinists and electrical workers. The machinists have been divided into two families with average communalities of 75.1% and 60.4%. The electrical workers have also been divided into two families with average communalities of 70.7% and 58.0%.

The last three families identified are shown below. The construction workers have been divided into two families with average communalities of 54.8% and 47.9%. The wood workers' family shown on the right has a communality of 68.2%.



Tool skills

The tool skill data were analyzed as follows:

- Those tool skills which are used by the majority of the occupations in the trade families were identified and called core skills.
- The remaining tool skills have been identified by trade families. Those skills which are only marginally required have been identified as optional requirements.

The skills listed on this and the following page only name the tools and equipments. Implied are the ability to select the appropriate tools, maintain and repair them (user maintenance), use or operate them, and the associated safety practices.

Core Skills

Rules, Tape
Rules, Steel
Tapes
Edges, Straight
Calipers, Outside
Calipers, Inside
Calipers, Transfer
Calipers, Vernier
Levels, Carpenter
Levels, Short
Plumb Bobs
Micrometers, Outside
Squares, Try
Squares, Carpenter
Bevels, Combination
Compasses/Dividers
Scribers
Chalk Lines
Soapstone
Pens, Lettering
Magnifiers
Mirrors
Gauges, Wire/Metal
Gauges, Thickness
Gauges, Drill/Angle
Pliers, Regular
Pliers, Combination
Pliers, Vise Grip
Pliers, Side Cutting

Pliers, End Cutting
Pliers, Diag. Cutting
Pliers, Flat Nose
Pliers, Long Nose
Pliers, Short Nose
Pliers, Utility
Vices, Machinist
Vices, Mach. Portable
Vices, Drill Press
Clamps, C and G
Scissors
Shears, Metal Master
Bolt Cutters
Wrenches, Open End
Wrenches, Box
Wrenches, Combination
Wrenches, Socket
Wrenches, Adjustable
Nut Drivers
Wrenches, Fixed Socket
Wrenches, Pipe
Spanners, Hook/Pin
Wrenches, Allen/Bristol
Screwdrivers, Blade
Screwdrivers, Robertson
Screwdrivers, Phillips
Screwdrivers, Offset
Screwdrivers, Ratchet
Screwdrivers, Reed & Prince

Screwdrivers, Hex Socket
Threading Sets, Nut/Bolt
Restorers
Extractors
Twist Drills
Pullers/Lifters
Hammers, Claw
Hammers, Ball Pein
Hammers, Soft Faced
Sledges, Short
Sledges, Long
Cold Chisels, Flat
Punches, Center
Punches, Pin
Punches, Gasket
Drift Pins
Bars, Wrecking
Bars, Crow
Rope
Chain/Hooks
Slings/Lines
Block & Tackle
Jacks
Scaffolding, Prefab
Saws, Hack
Files, Square
Files, Triangular
Files, Round
Files, Half Round

Files, Mill/Flat
Files, 3 Sided
Sand Paper
Emery Paper
Knives, Utility
Knives, Pocket
Knives, Putty
Brooms
Whisks
Brushes, Steel Wire
Brushes, Paint (General)
Drills, Elec. Hand
Sabre Saws
Disc Sanders
Drill Presses
Bench Grinders
Auto/Van/Truck
Safety, Power Tools
Safety, Equip./Machinery
Safety, Falls/Falling Objects
Safety, Electrical
Safety, Burns/Fire
Safety, Acids/Poisons
Safety, High Pressure Lines
Safety, Caustic Burns
Safety, Pressure Gases
Safety, Airborn Dust
Safety, Explosive Dust
Safety, Excessive Noise

FAMILY SKILLS

SKILLS WITHIN TRADE FAMILY

✓ COMMON SKILLS
• OPTIONAL SKILLS

	Mechanics	Machinists "A"	Machinists "B"	Metal Workers "A"	Metal Workers "B"	Electrical Workers "A"	Electrical Workers "B"	Woodworkers	Construction Workers "A"	Construction Workers "B"
Rules, Folding		✓								
Rules, Hook		✓								
Rules, w/ holder		✓								
Scales, Engr. & Arch.	•	•	•							
Calipers, Hermaph.	✓	✓	✓					✓		
Micrometer, Inside	✓	✓	✓			•		✓		
Micrometers, Depth	✓	✓	✓			•	•	✓		
Micrometers, Electron.	•	✓	✓							
Combi-Digis	✓	✓	•							
Levels, Long	✓	✓	✓	✓	✓	•		✓	✓	✓
Levels, Machinist	✓	✓	•	✓	✓					
Levels, Precision	✓	✓	•	✓	✓					
Levels, Cross or Test	✓	✓	✓					✓		
Levels, Line	✓	✓	✓							
Levels, Grade	•									
Dumpy Levels	•			✓						
Squares, Pitch/ Angle	•	✓	✓		•			✓		
Bevels, Sliding T	✓	✓	✓	✓		•		✓		
Centre Heads	✓	✓	✓	✓				✓		
Bevel Protractors	✓	✓	✓	✓				✓		
Bevel Prot., Univers.	✓	✓	✓	✓				✓		
Compasses, Magnetic	•	•								
Transits	•									
Triangles	✓	•	•	✓		•	•	✓		
T-Squares	•							✓		
Curves, French		•					•	✓		
Protractors	✓	•		✓			•	✓		
Prec. Drafting Instrs.	•	✓					•	✓		
Templates								✓		
Board/ Table, Drafting				✓	✓		•	✓	✓	✓
Pencils, Carpenter	•			✓	✓			✓	✓	✓
Pencils, Chins	•	•	•	✓	✓			✓	✓	✓
Pens, Drafting	✓	✓	✓	✓	✓	•	•	✓	✓	✓
Lettering Sets	✓	✓	✓	✓	✓		•	✓	✓	✓
Gauges, Screw/ Thread	✓	✓	✓	✓	✓	✓		✓	✓	✓
Gauges, Small Hole	✓	✓	✓	✓	✓	✓		✓	✓	✓
Gauges, Telescoping	✓	✓	✓	✓	✓	✓	•	✓	✓	✓
Gauges, Mortise	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Trammel Head	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Depth	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Layout	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Surface	•	•					•	✓		
Gauges, Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Go/ No Go	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Taper	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Snap	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Machinist Con.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Tap & Drill	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gauges, Gear Tooth	✓	•	✓							

SKILLS WITHIN TRADE FAMILY

✓ COMMON SKILLS
• OPTIONAL SKILLS

	Mechanics	Machinists "A"	Machinists "B"	Metal Workers "A"	Metal Workers "B"	Electrical Workers "A"	Electrical Workers "B"	Woodworkers	Construction Workers "A"	Construction Workers "B"
Gauges, Planer/ Shaper	•	✓								
Gauges, Universal	✓	✓	•							
Pliers, Iron Worker	✓	•		✓		✓			✓	
Tongs, Long	✓			✓		✓			✓	
Pliers, Heavy Duty	✓			✓		✓			✓	
Hemostats	✓									
Crimpers	✓									
Twisters	✓									
Strippers	✓	•		•						
Pliers, Punch	✓			✓		✓				
Pliers, Double Action	✓					✓				
Pincers	✓					✓				
Vices, Wood, Portable	✓							✓		
Vices, Port. Yoke	✓	•		✓		✓				
Vices, Vacuum Base	•						•			
Vices, Wood, Regular	✓							✓		
Vices, Wood, Drill Pr.	✓	•						✓		
Vices, Metal Utility	✓	✓				✓	•			
Vices, Sheet Metal	•			✓		✓				
Vices, Yoke Pipe	✓			✓		✓				
Vices, Chain Pipe	✓			✓		✓				
Vices, Milling Mach.	✓	✓		✓		✓	•			
Vices, Powered	•									
Step B Locks	•	✓		✓		✓				
"V" Blocks	✓	✓		✓		✓	•	✓		
Clamps, 3 way	✓	✓		✓		✓		✓		
Clamps, Spring	✓	✓		✓		✓		✓		
Clamps, Hand Screw	✓	✓	•	✓		✓		✓		
Clamps, Pipe or Bar	✓	✓	•	✓		✓	•	✓		
Clamps, Heads	•	✓		✓		✓	•	✓		
Clamps, Heavy Duty	✓	✓		✓		✓		✓		
Clamps, Quick Action	✓	✓		✓		✓		✓		
Clamps, Strap/ Band	✓	✓		✓		✓		✓		
Clamps, Welding	✓	✓		✓		✓		✓		
Clamps, Corner	✓	✓		✓		✓		✓		
Clamps, Miter	✓	✓		✓		✓		✓		
Clamps, Toolmakers	✓	✓		✓		✓		✓		
Shears, Specialized	✓	✓		✓		✓		✓		
Wrenches, Pipe Offset	✓	✓		✓		✓		✓		
Wrenches, Basin	✓			✓		✓		✓		
Wrenches, Spud	✓			✓		✓		✓		
Wrenches, Hvy Ratchet	✓	✓		✓		✓		✓		
Wrenches, Torque	✓	✓		✓		✓		✓		
Wrenches, Hydraulic	✓	✓		✓		✓		✓		
Wrenches, Internal	✓	✓		✓		✓		✓		
Spanners, Large	✓	✓		✓		✓		✓		
Spanners, Miniature	✓	✓		✓		✓		✓		
Screwdrivers, Minist.	✓	✓		✓		✓		✓		
Screwdrivers, Ratchet	✓	•								

SKILLS WITHIN TRADE FAMILY

✓ COMMON SKILLS
• OPTIONAL SKILLS

	Mechanics	Machinists "A"	Machinists "B"	Metal Workers "A"	Metal Workers "B"	Electrical Workers "A"	Electrical Workers "B"	Woodworkers	Construction Workers "A"	Construction Workers "B"
Screwdrivers, Pozidr.	✓	•		✓		✓		✓		
Screwdrivers, Torx	✓	•		✓		✓		✓		
Screwdrivers, Torq. st.	✓			✓		✓		✓		
Screwdrivers, Bristo	✓			•	•	✓		✓		
Screwdrivers, Slab	✓			✓	✓	✓		✓		
Screwdrivers, Clutch Hd.	✓			✓	✓	✓	•	✓		
Screwdrivers, Clutch	✓			✓	✓	✓	•	✓		
Screwdrivers, Ign.	✓			✓	✓	✓		✓		
Screw Starters	✓			✓	✓	✓		✓		
Pipe Threaders	✓	•		✓		✓		✓		
Chasers	✓	✓		✓		✓		✓		
Braces, Hand	✓	✓		✓	✓	✓		✓		
Drills, Hand/ Breast	✓	✓		✓	✓	✓	•	✓		
Drills, Spiral/ Push	✓	✓		✓	✓	✓	•	✓		
Bits, Auger	✓	✓		✓	✓	✓	•	✓		
Bits, Expansion	✓	✓		✓	✓	✓	•	✓		
Bits, Reamers	✓	✓		✓	✓	✓	•	✓		
Bits, Hole Saws	✓	✓		✓	✓	✓	•	✓		
Bits, Rotary Files	✓	✓		✓	✓	✓	•	✓		
Drills, Masonry	✓	✓		✓	✓	✓	•	✓		
Countersinks	✓	✓		✓	✓	✓	•	✓		
Bits, Extension	✓	✓		✓	✓	✓	•	✓		
Circle Cutters	✓	✓		✓	✓	✓	•	✓		
Bits, Spade	✓	✓		✓	✓	✓	•	✓		
Bits, Spec. Auger	✓	✓		✓	✓	✓	•	✓		
Drill Bits, Spec.	✓	✓		✓	✓	✓	•	✓		
Tub E Cutters	✓	✓		✓	✓	✓	•	✓		
Pipe Cutters	✓	✓		✓	✓	✓	•	✓		
Reamers	✓	✓		✓	✓	✓	•	✓		
Flaring Tools	✓	✓		✓	✓	✓	•	✓		
Benders, Tube	✓	✓		✓	✓	✓	•	✓		
Benders, Pipe	✓	✓		✓	✓	✓	•	✓		
Cutters, Int. Tube	✓	✓		✓	✓	✓	•	✓		
Swaging Tools	✓	✓		✓	✓	✓	•	✓		
Conduit Tools	✓	✓		✓	✓	✓	•	✓		
Hammers, Rivetting	✓	✓		✓	✓	✓		✓		
Hammers, Magnetic	✓	✓		✓	✓	✓		✓		
Hammers, Blacksmith	✓	✓		✓	✓	✓		✓		
Hammers, Scaling	✓	✓		✓	✓	✓		✓		
Hammers, Body&Fender	✓	✓		✓	✓	✓		✓		
Sledges, Stone	✓	✓		✓	✓	✓		✓		
Sledges, Mash	✓	✓		✓	✓	✓		✓		
Chisels, Cape	✓	✓		✓	✓	✓		✓		
Chisels, Half Round	✓	✓		✓	✓	✓		✓		
Chisels, Diamond	✓	✓		✓	✓	✓		✓		
Chisels, Round Nose	✓	✓		✓	✓	✓		✓		
Chisels, Blacksmith	✓	✓		✓	✓	✓		✓		
Chisels, Hot	✓	✓		✓	✓	✓		✓		
Chisels, Gen Purpose	✓	✓		✓	✓	✓		✓		

SKILLS WITHIN TRADE FAMILY

✓ COMMON SKILLS
• OPTIONAL SKILLS

	Mechanics	Machinists "A"	Machinists "B"	Metal Workers "A"	Metal Workers "B"	Electrical Workers "A"	Electrical Workers "B"	Woodworkers	Construction Workers "A"	Construction Workers "B"
Chisels, Masonry	•									•
Socket Chisels, Firmer						✓	•	✓		
Sock. Chisels, Paring						✓		✓		
Sock. Chisels, Mortis.						✓		✓		
Sock. Chisels, Butt						✓		✓		
Sock. Chisels, Hvy. Duty						✓		✓		
Sock. Chisels, Miniat.						✓		✓		
Punches, Prick	✓	✓	•	✓		✓		✓		
Punches, Starting	✓	✓	•	✓		✓		✓		
Punches, Aligning	✓	✓		✓		✓		✓		
Punches, Rivet	✓	✓		✓		✓	•	✓		
Punches, Blacksmith	✓	✓		✓		✓		✓		
Nail Sets	•					✓	•	✓		
Star Drills						✓		✓		
Drift Punches	✓	✓	•	✓		✓	•	✓		
Anvils	•	✓		✓		✓		✓		
Axes, Single Blade								✓	✓	✓
Hatchets								✓	✓	✓
Tang Chisels, Firmer						✓		✓		
Tang Chisels, Paring						✓		✓		
Tang Chisels, Mortis.						✓		✓		
Tang Chisels, Butt						✓		✓		
Tang Chisels, Min.						✓		✓		
Nail Pullers	✓	✓		✓		✓		✓		✓
Bars, Mechanic	✓	✓		✓		✓		✓		
Skids/Rollers	✓	✓		✓		✓		✓		
Hoists, Portable	✓	✓		✓		✓		✓		
Derricks	✓	✓		✓		✓		✓		✓
Aerial Transport.	✓	✓		✓		✓		✓		✓
Scaffolds, Suspended	•	✓		✓		✓		✓	✓	✓
Scaffolds, SelfConst.	•	✓		✓		✓		✓	✓	✓
Shovels, Round	•	✓		✓		✓		✓	✓	✓
Spades, Square	•	✓		✓		✓		✓	✓	✓
Shovels, Large										
Picks	•	✓		✓		✓		✓	✓	✓
Augers										
Wheelbarrows, Light	•	✓		✓		✓		✓	✓	✓
Wheelbarrows, Heavy										
Garden Tools										
Rod Saws										
Saws, Carp. Crosscut	✓	✓		✓		✓		✓	✓	✓
Saws, Rip	✓	✓		✓		✓		✓	✓	✓
Saws, Keyhole/Nest	✓	✓		✓		✓		✓	✓	✓
Saws, Bow										
Saws, Tungsten										
Saws, Crosscut										
Saws, Buck										
Saws, Utility										
Rasps, Wood										
Rasps, Shaper										
Files, Needle										
Files, Auger Bit										
Files, Riffler										
Stones, Rectangular										
Stones, Square										
Stones, Round										
Stones, Triangular										
Stones, Round Edge										
Stones, Gouge Slip										
Steels/Strops										
Stones, Carborundum										
Stones, Sharpening										
Portable Hand Grinders										

3KILLS WITHIN TRADE FAMILY

✓ COMMON SKILLS
• OPTIONAL SKILLS

	Mechanics	Machinists "A"	Machinists "B"	Metal Workers "A"	Metal Workers "B"	Electrical Workers "A"	Electrical Workers "B"	Woodworkers	Construction Workers "A"	Construction Workers "B"
Holders, Abrasive Pap.	✓	✓		✓		✓		✓	✓	✓
Scrapers, Gen. Purpose	✓	✓		✓		✓		✓	✓	✓
Scrapers, Shavehook										
Scrapers, Paint	✓	✓		✓		✓		✓	✓	✓
Scrapers, Smoothing										
Planes, Jack										
Planes, Jointer										
Planes, Block										
Planes, Spokeshave										
Planes, Draw Knives										
Carving Tools										
Soldering Irons, Elec.	✓	✓	•	✓		✓		✓	✓	✓
Soldering Guns, Elec.	✓	✓		✓		✓		✓	✓	✓
Sold. Pencils, Elec.	✓	✓	•	✓		✓		✓	✓	✓
Iron & Torch	✓	✓	•	✓		✓		✓	✓	✓
Torch, Propane	✓	✓	•	✓		✓		✓	✓	✓
Torch, Oxy. Propane	✓	✓	•	✓		✓		✓	✓	✓
Torch, Air Acetylene	✓	✓	•	✓		✓		✓	✓	✓
Silver Soldering Tool	✓	✓	•	✓		✓		✓	✓	✓
Min. Sold. Tools	✓	✓	•	✓		✓		✓	✓	✓
Welders, Oxy-Acety.	✓	✓		✓		✓		✓	✓	✓
Welders, Elec.	✓	✓		✓		✓		✓	✓	✓
Welders, Metal Gas	✓	✓		✓		✓		✓	✓	✓
Welders, Tungsten Gas	✓	✓		✓		✓		✓	✓	✓
Welders, Plastic	✓	✓		✓		✓		✓	✓	✓
Ovens/Forges	✓	✓		✓		✓		✓	✓	✓
Heat Guns	✓	✓		✓		✓		✓	✓	✓
Furnaces/Torches	✓	✓		✓		✓		✓	✓	✓
Quench Tanks	✓	✓		✓		✓		✓	✓	✓
Forming Equipment	✓	✓		✓		✓		✓	✓	✓
Trowels, Common	✓	✓		✓		✓		✓	✓	✓
Pointers	✓	✓		✓		✓		✓	✓	✓
Trowels, Cement	✓	✓		✓		✓		✓	✓	✓
Trowels, Drywall	✓	✓		✓		✓		✓	✓	✓
Jointers/Groovers	✓	✓		✓		✓		✓	✓	✓
Floats, Plasterers	✓	✓		✓		✓		✓	✓	✓
Floats, Steel/Wood	✓	✓		✓		✓		✓	✓	✓
Pointing Tools	✓	✓		✓		✓		✓	✓	✓
Brushes, Lubricant	✓	✓		✓		✓		✓	✓	✓
Brushes, Adhesive	✓	✓		✓		✓		✓	✓	✓
Brushes, Paste	✓	✓		✓		✓		✓	✓	✓
Brushes, Smoothing	✓	✓		✓		✓		✓	✓	✓
Brushes, Flux/cement	✓	✓		✓		✓		✓	✓	✓
Paint Brushes, Good	✓	✓		✓		✓		✓	✓	✓
Paint Brushes, Sash	✓	✓		✓		✓		✓	✓	✓
Paint Brushes, Trim	✓	✓		✓		✓		✓	✓	✓
Paint Brushes, Cutting	✓	✓		✓		✓		✓	✓	✓
Spray Paint Units	✓	✓		✓		✓		✓	✓	✓
Roller Paint Tools	✓	✓		✓		✓		✓	✓	✓
Paint Brushes, Large	✓	✓		✓		✓		✓	✓	✓
Paint Brushes, Min.	✓	✓		✓		✓		✓	✓	✓
Nail Guns	✓	✓		✓		✓		✓	✓	✓
Staplers	✓	✓		✓		✓		✓	✓	✓
Rivetting Tools	✓	✓		✓		✓		✓	✓	✓
Hand Strikers	✓	✓		✓		✓		✓	✓	✓
Caulking Guns	✓	✓		✓		✓		✓	✓	✓
Ammeters	✓	✓		✓		✓		✓	✓	✓
Ohmmeters	✓	✓		✓		✓		✓	✓	✓
Voltmeters	✓	✓		✓		✓		✓	✓	✓
Wattmeters	✓	✓		✓		✓		✓	✓	✓
Wheatstone Bridges	✓	✓		✓		✓		✓	✓	✓
Oscilloscopes	✓	✓		✓		✓		✓	✓	✓
Testers, Transistor	✓	✓		✓		✓		✓	✓	✓

SKILLS WITHIN TRADE FAMILY

✓ COMMON SKILLS
• OPTIONAL SKILLS

	Mechanics	Machinists "A"	Machinists "B"	Metal Workers "A"	Metal Workers "B"	Electrical Workers "A"	Electrical Workers "B"	Woodworkers	Construction Workers "A"	Construction Workers "B"
Testers, Circuit	✓					✓		✓		
Testers, El. Effic.	✓					✓		✓		
Testers, El. Circuit	✓					✓		✓		
Degaussing Tools	✓					✓		✓		
Stroboscopes	✓					✓		✓		
Tachometers	✓					✓		✓		
Ignition Timers	✓					✓		✓		
Stop Watches	✓					✓		✓		
Light Meters	✓					✓		✓		
Testers, Pressure	✓					✓		✓		
Testers, Compression	✓					✓		✓		
Testers, Oil/Fluid	✓					✓		✓		
Gauge Boards	✓					✓		✓		
Testers, Velocity	✓					✓		✓		
Testers, Smoke/Gas	✓					✓		✓		
Testers, Furnace Eff.	✓					✓		✓		
Testers, Freon Gas	✓					✓		✓		
Testers, Flue-Gas Temp.	✓					✓		✓		
Testers, Temperature	✓					✓		✓		
Testers, Sound Int.	✓					✓		✓		
Testers, Frequency	✓					✓		✓		
Circular Saws, Port.	✓	✓		✓		✓		✓	✓	✓
Sanders, Portable	✓	✓		✓		✓		✓	✓	✓
Belt Sanders, Port.	✓	✓		✓		✓		✓	✓	✓
Grinders, Portable	✓	✓	•	✓		✓		✓	✓	✓
Min. Elec. Tools	✓	✓		✓		✓		✓	✓	✓
Saws, Reciprocating	✓	✓		✓		✓		✓	✓	✓
Planers, Portable	✓	✓		✓		✓		✓	✓	✓
Routers, Portable	✓	✓		✓		✓		✓	✓	✓
Impact Wrenches, Port.	✓	✓	•	✓		✓		✓	✓	✓
Chain Saws	✓	✓		✓		✓		✓	✓	✓
Fasteners, Low Velc.	✓	✓		✓		✓		✓	✓	✓
Fasteners, High Velc.	✓	✓		✓		✓		✓	✓	✓
Impact Drills	✓	✓		✓	•	✓		✓	✓	✓
Air Wrenches	✓	✓		✓	•	✓		✓	✓	✓
Chipping Hammers	✓	✓		✓	•	✓		✓	✓	✓
Impact Wrenches	✓	✓		✓	•	✓		✓	✓	✓
Pneumatic Saws	✓	✓		✓	•	✓		✓	✓	✓
Air Rivetting Gun	✓	✓		✓	•	✓		✓	✓	✓
Table Saws	✓	✓		✓		✓	•	✓	✓	✓
Radial Arm Saws	✓	✓		✓		✓	•	✓	✓	✓
Hand Saws	✓	✓		✓		✓		✓	✓	✓
Metal Cutting Lathes	✓	✓	•	✓		✓	•	✓	✓	✓
Wood Cutting Lathes	✓	✓	•	✓		✓	•	✓	✓	✓
Milling Machines	✓	✓	•	✓		✓	•	✓	✓	✓
Fixed Sanders	✓	✓		✓		✓		✓	✓	✓
Jointers	✓	✓		✓		✓		✓	✓	✓
Shapers	✓	✓		✓		✓		✓	✓	✓
Metal Form/Cut Eqpt.	✓	✓	•	✓		✓	•	✓	✓	✓
Punch Presses	✓	✓	•	✓		✓	•	✓	✓	✓
Fixed Routers	✓	✓		✓		✓		✓	✓	✓
Miniaturegrinders	✓	✓	•	✓		✓	•	✓	✓	✓
Heavy Truck	✓	✓		✓		✓		✓	✓	✓
Dual Axle Truck	✓	✓		✓		✓		✓	✓	✓
Fork Lift	✓	✓		✓		✓		✓	✓	✓
Wheeled Tractor	✓	✓		✓		✓		✓	✓	✓
Heavy Duty Tract.	✓	✓		✓		✓		✓	✓	✓
Safety, Vibration	✓	✓		✓		✓		✓	✓	✓
Safety, Radiation	✓	✓		✓		✓		✓	✓	✓
Safety, Biological	✓	✓		✓		✓		✓	✓	✓
Safety, Excess. Light	✓	✓		✓		✓		✓	✓	✓

Uses of information

School vocational programs

Designers of vocational programs for secondary schools have always had the problem of deciding the degree to which vocational programs should be generalized. The general tendency is to offer specific programs, such as Motor Vehicle Mechanic Training. However, these data suggest that it would be more appropriate, in many cases, to offer generalist programs such as Mechanical Servicing, which has a much wider array of potential jobs upon completion. Curriculum designers could offer speciality training during the last year and thus defer the specific occupational choice to be made by the students.

In effect, by offering vocational programs which focus on the skills used by a variety of occupations, the graduates would have much improved job prospects and, equally important, would have been able to defer their occupational choice during their formative years.

Perhaps even more useful would be a decision to offer a general trades vocational program which simply allowed the students to learn and practise the care and use of those tools and equipment (with associated safety practices) which are common requirements across nearly all the craft trades. This could be followed by more specialized programs. Certainly the students and teaching staff would have a better comprehension of the students' strengths, weaknesses, likes and dislikes after such a generalized program; this understanding should vastly improve their occupational choices.

Adult skill programs

The data from these studies clearly indicate that the skills used in the craft trades have more communalities than differences. Although adults are better prepared than youth in secondary schools to make clear-cut occupational choices, the rate of technological change and the fluctuating labour market make it imperative that adults be prepared to adapt. Skill programs which prepare students for a single occupation, as well as the resulting credentials, "lock-in" the graduates to the single occupation. In fact, students of single occupational programs "learn" that they have acquired skills and knowledge relevant only to their chosen occupation. When faced with a poor job market, they have no thought that their hard-earned skills and knowledge could be effectively used in some other type of work.

It is imperative that adult skill training programs be developed to promote flexibility of the graduates. Skills should be chosen on the basis of transferability; the credentials should "recognize" the actual skills acquired (rather than only a statement of proficiency in a single occupation's name); and perhaps even more important, the behaviours of the teaching staff should promote the attitude of multi-occupational choice on the part of the graduates.

Adult retraining

When faced with chronic shortages of qualified trades people (such as Machinists and Tool and Die Makers) it is normal to consider attempting to increase the capacity of the training programs and to attract more young people into the short-supply trades. This is costly and time consuming because existing systems take four to five years to produce qualified trades people. It would appear to be more efficacious to take highly qualified people who are in trades with skill surpluses, identify their skill deficiencies in the shortage trades, and put them through a retraining program. This would certainly take less time than would complete skill training; it would improve their versatility; and the skill deficiency would be met in less time.